

**CITY OF TEMPE AMENDMENTS TO THE
2003 INTERNATIONAL RESIDENTIAL CODE
ARTICLE III, SECTION 8-300 OF THE
TEMPE CITY CODE**

Sec. R201. GENERAL.

[§ R201.4 is hereby amended as follows:]

"Section R201.4. Terms not defined. Where terms are not defined through the methods authorized by this section, such terms shall have ordinarily accepted meanings such as the context implies. Webster's Third New International Dictionary of the English Language, Unabridged, shall be considered as providing ordinarily accepted meanings."

Sec. R202. DEFINITIONS.

[§ R202 is hereby amended as follows:]

"EMERGENCY ESCAPE AND RESCUE OPENING. An operable window, door or similar device that provides for a means of escape that opens directly into a public street, public alley, yard or court and provides access for rescue in the event of an emergency."

"EXTERIOR WALL. Any wall or element of a wall or any member or group of members, which defines the exterior boundaries or courts of a building and which has a slope of 60 degrees or greater with the horizontal plane."

Sec. R301. DESIGN CRITERIA.

[§ R301.1.1 is hereby amended as follows:]

"Section R301.1.1. Alternative provisions. As an alternative to the requirements in Section R301.1 with prior approval of the building official the following standards are permitted subject to the limitations of this code and the limitations therein. Where engineered design is used in conjunction with these standards the design shall comply with the *International Building Code*.

"1. American Forest and Paper Association (AF&PA) *Wood Frame Construction Manual* (WFCM).

"2. American Iron and Steel Institute (AISI), *Standard for Cold-Formed Steel Framing- Prescriptive Method for One- and Two-family Dwellings* (COFS/PM)."

Table R301.2(1). CLIMATIC AND GEOGRAPHICAL DESIGN CRITERIA .

[§ Table 301.2 (1) is hereby amended as follows:]

**"Table R301.2 (1)
CLIMATIC AND GEOGRAPHICAL DESIGN CRITERIA**

GROUND SNOW LOAD	WIND SPEED ^e (mph)	SEISMIC DESIGN CATEGORY ^g	SUBJECT TO DAMAGE FROM				WINTER DESIGN TEMP ^f	ICE SHIELD UNDER- LAYMENT REQUIRED ⁱ	FLOOD HAZARDS ^h	AIR FREEZING INDEX ^j	MEAN ANNUAL TEMP. ^k
			Weathering ^a	Frost line depth ^b	Termite ^c	Decay ^d					
0	90 (3 sec. gust)	C	Negligible	12 inches	moderate to heavy	None to slight	34 degrees	N/A	See Maricopa County	0	71.2°F

Table R301.5. MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS.

[§ Table 301.5 is hereby amended as follows:]

**"TABLE R301.5
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS
(In pounds per square foot)**

USE	LIVE LOAD
Attics without storage ^{b, g}	10
Attics with storage ^b	40
Sleeping rooms	40

g. For truss systems, this load need not be considered as acting simultaneously with other live loads imposed upon the ceiling framing or its supporting structure."

The remainder of the table is unchanged.

Sec. R303. LIGHT VENTILATION AND HEATING.

[§ R303.2, exception is hereby amended as follows:]

"Exceptions:

"1. Openings required for light and/or ventilation shall be permitted to open into a thermally isolated sunroom addition or patio cover, provided that there is an openable area between the adjoining room and the sunroom addition or patio cover of not less than one-tenth of the floor area of the interior room but not less than 20 square feet (1.86 m2). The minimum openable area to the outdoors shall be based upon the total floor area being ventilated.

"2. Bathrooms, kitchens and laundry rooms are not permitted to be ventilated through an adjoining room."

Sec. R305. CEILING HEIGHT.

[§ R305.1 is hereby amended as follows:]

"Section R305.1. *Minimum height.* Habitable Rooms shall have a ceiling height of 7 feet 6 inches (2286 mm). Hallways, corridors, bathrooms, toilet rooms, laundry rooms and basements shall have a ceiling height of not less than 7 feet (2134 mm).

"Exceptions:

- "1. Beams and girders spaced not less than 4 feet (1219 mm) on center may project not more than 6 inches (152 mm) below the required ceiling height.
- "2. Ceilings in basements without habitable space may project to within 6 feet, 8 inches (2032 mm) of the finished floor; and beams, girders, ducts or other obstructions may project to within 6 feet, 4 inches (1931 mm) of the finished floor.
- "3. Not more than 50 percent of the required floor area of a room or space is permitted to have a sloped ceiling less than 7 feet (2134 mm) in height with no portion of the required floor area less than 5 feet (1524 mm) in height.
- "4. Bathrooms may have a minimum ceiling height of 6 feet 8 inches (2036 mm) over the fixture."

Sec. R309. GARAGES AND CARPORTS.

[§ R309.1 is hereby amended as follows:]

"*Section R309.1. Opening protection.* Openings from a private garage directly into a room used for sleeping purposes shall not be permitted. Other openings between the garage and residence shall be equipped with solid wood doors not less than 1 $\frac{3}{8}$ inch (35 mm) in thickness, solid or honeycomb core steel doors not less than 1 $\frac{3}{8}$ inches (35 mm) thick, or 20-minute fire-rated doors. Doors providing opening protection shall be maintained self-closing and self-latching."

Sec. R309. GARAGES AND CARPORTS.

[§ R309.2 is hereby amended as follows:]

"*Section R309.2. Separation required.* The garage shall be separated from the residence and its attic area by not less than $\frac{1}{2}$ -inch (12.7 mm) gypsum board applied to the garage side. Garages beneath habitable rooms shall be separated from all habitable rooms above by not less than $\frac{5}{8}$ -inch (15.9 mm) Type X gypsum board or equivalent. Where the separation is a floor-ceiling assembly, the structure supporting the separation shall also be protected by not less than $\frac{1}{2}$ -inch (12.7 mm) gypsum board or equivalent.

"Exception: Buildings protected with an automatic fire sprinkler system, including the private garage, the separation shall be permitted to be limited to a minimum $\frac{1}{2}$ -inch (12.7 mm) gypsum board applied to the garage side."

Sec. R310. EMERGENCY ESCAPE AND RESCUE OPENINGS.

[§ R310.1 is hereby amended as follows:]

"*Section R310.1. Emergency escape and rescue required.* Basements with habitable space and every sleeping room shall have at least one openable emergency escape and rescue opening. Where basements contain one or more sleeping rooms, emergency escape and rescue openings

shall be required in each sleeping room, but shall not be required in adjoining areas of the basement. Where emergency escape and rescue openings are provided they shall have a sill height of not more than 44 inches (1118 mm) above the floor. Where a door opening having a threshold below the adjacent ground elevation serves as an emergency escape and rescue opening and is provided with a bulkhead enclosure, the bulkhead enclosure shall comply with Section R310.3. The net clear opening dimensions required by this section shall be obtained by the normal operation of the emergency escape and rescue openings from the inside. Emergency escape and rescue openings with a finished sill height below the adjacent ground elevation shall be provided with a window well in accordance with Section R310.2. All emergency escape and rescue openings shall open directly into a public street, public alley, yard or court."

Sec. R411. MEANS OF EGRESS .

[§ R311.4.4 is hereby amended as follows:]

"Section R311.4.4. Type of lock or latch. All egress doors shall be readily openable from the side from which egress is to be made without the use of a key or special knowledge or effort.

"Exception: Group R, Division 3 Occupancies and individual dwelling units and guest rooms within Group R, Division 1 Occupancies. Such occupancies may be provided with a night latch, double keyed dead bolt or security chain, provided such devices are openable from the inside without the use of a tool."

Sec. R313. SMOKE ALARMS AND FIRE SPRINKLERS.

[§ R313.3 is hereby added as follows:]

"Section R313.3. Fire Sprinklers. All areas of new buildings or structures, and other locations required by this Chapter, shall be provided with an automatic fire sprinkler system complying with IBC Section 903.3.1.1, 903.3.1.2 or 903.3.1.3 as applicable.

"Exception: Automatic fire sprinkler protection systems shall not be required for the following:

1. R-3 occupancies of 5,000 square feet or less and other buildings or structures accessory to R-3 occupancies."

Sec. R313. SMOKE ALARMS AND FIRE SPRINKLERS.

[§ R313.3.1 is hereby added as follows:]

"Section R313.3.1. Additions. Automatic fire sprinkler protection systems are not required in existing non-sprinklered R-3 Occupancies or additions thereto."

Sec. R324. BUILDING SECURITY.

[§ R324 is hereby added as follows:]

"SECTION R324 BUILDING SECURITY.

"R324.1. Scope. The provisions of this chapter shall apply to openings into dwelling units and to openings between attached garages and dwelling units. Door openings, including vehicular access doors in enclosed attached garages shall be in accordance with the provisions of this chapter.

"Exceptions:

- "1. An opening in an exterior wall when all portions of such openings are more than 12 feet (3658 mm) vertically or 6 feet (1829 mm) horizontally from an accessible surface of any adjoining yard, court, passageway, public way, walk, breezeway, patio, planter, porch or similar area.
- "2. An opening in an exterior wall when all portions of such openings are more than 12 feet (3658 mm) vertically or 6 feet (1829 mm) horizontally from the surface of any adjoining roof, balcony, landing, stair tread, platform or similar structure or when any portion of such surface is itself more than 12 feet (3658 mm) above an accessible surface.
- "3. Any opening in a roof when all portions of such roof are more than 12 feet (3658 m) above an accessible surface.
- "4. Openings when the small dimension is 6 inches (152 mm) or less, provided that the closest edge of the opening is at least 36 inches (914 mm) from the locking device of the door or window assembly.
- "5. Openings protected by required fire door assemblies having a fire-endurance rating of not less than 45 minutes."

"Sec. R324.2 Swinging doors.

"Section R324.2.1. General. Swinging doors shall be one of the following:

- "1. Wood flush-type door 1-3/4 inches thick minimum.
- "2. Wood panel-type door 1-3/4 inches thick minimum with all panels fabricated from material not less than 3/8 inch in thickness; provided all shaped portions of the panels are not less than 1/4 inch thick.
- "3. Ferrous metal doors of solid or hollow core construction with surfaces not less than 24 gauge in thickness.
- "4. Other metal doors with surfaces not less than the equivalent of 16 gauge sheet metal (0.06 inch) in thickness.

"Sec. R324.2.2 Locking hardware. Single swinging doors and the active leaf of doors in pairs shall be equipped with an approved exterior key operating deadbolt or locking device as follows:

1. Strike deadbolts with a minimum throw of 1 inch and an embedment of not less than 5/8 inch into the holding device receiving the projected bolt.
2. Hook shape or expanding lug deadbolts with a minimum throw of 3/4 inch.
3. Deadbolts or locks which automatically activate two or more deadbolts with an embedment of not less than 1/2 inch into the holding device receiving the projected bolts.

"The inactive leaf of doors in pairs shall be equipped with manually or automatically operated hardened bolts at the top and bottom, with an embedment not less than 1/2 inch into the device receiving the projected bolt.

"Cylinder guards shall be installed on all mortise or rim-type cylinder locks whenever the cylinder projects beyond the face of the door or is otherwise accessible to gripping tools.

"See Sec. R311.4.4 for requirements on door operation for exiting.

"Sec. R324.3 Windows. Window assemblies regulated by this chapter which are designed to be openable shall be constructed and installed so as to prohibit raising, sliding, or removal of the moving section while in the closed and locked position, unless such windows are protected by approved metal bars, screens or grilles. Louvered windows regulated by this chapter shall be protected by approved metal bars, or grilles.

"Sec. R324.4 Upward Acting Doors. Upward acting doors shall be secured with a cylinder lock, padlock with a hardened steel shackle and hardened steel hasp, metal slide bar, bolt or equivalent device, unless secured by electric power operation.

"Cylinder guards shall be installed on all mortise or rim-type cylinder locks whenever the cylinder projects beyond the face of the door or is otherwise accessible to gripping tools."

Sec. R401. GENERAL.

[§ R401.1 is hereby amended by adding an **Exception 3.** as follows:]

- "3. Where a design is not provided, the minimum foundation requirements for stud and concrete masonry bearing walls shall be as set forth in Table R403.1(2)."

Table R403.1. FOUNDATIONS FOR STUD AND CONCRETE MASONRY BEARING WALLS – MINIMUM REQUIREMENTS.

[§ Table R403.1. is hereby amended as follows:]

"TABLE R403.1 FOUNDATIONS FOR STUD AND CONCRETE MASONRY BEARING WALLS – MINIMUM REQUIREMENTS

Number of Floors Supported by the Foundation ³	Thickness of Foundation Wall ² (inches – Nominal Dimension)		Width of Footing ^{2,4} (W)\ (inches)		Thickness of Footing (inches)		Depth Below Undisturbed Soil (inches)
	Stud Wall						
	Concrete	Masonry ⁵	Stud Wall ¹	Masonry Wall	Stud Wall	Masonry Wall	
1	6	6	12	16	6	8	12
2	8	8	15	20	7	8	18
3	10	8	18	24	8	8	24

"For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kN/m².

- "1. Interior stud bearing walls may be supported by isolated footings. The footing width and length shall be twice the width shown in this table and the footings shall be spaced not more than 6 feet (1,829mm) on center.
- "2. A minimum of two (2) #4 reinforcing bars (minimum grade 40) are required in the footing/stem concrete. If metal hold downs are used, one #4 horizontal reinforcing bar must be placed within the top 6" of the stem wall.
- "3. Foundations may support a roof in addition to the stipulated number of floors. Foundations supporting roofs only shall be as required for supporting only one floor.
- "4. Isolated columns carrying loads in excess of 750 lbs shall be supported on minimum 4 square feet of footing, with minimum width of 24 inches. Maximum bearing pressure from service loads shall not exceed 1500 psf unless recommended by the soils report.
- "5. Foundation wall width may not be less than the width of the masonry wall."

Sec. R614. EARTHEN WALL STRUCTURES.

[§ R614 is hereby added as follows:]

"SECTION R614 - EARTHEN WALL STRUCTURES

"R614.1 General. Earthen wall structures in Seismic Design Category A, B or C with basic windspeed of 90 mph or less with wind exposure category of A, B, or C may be designed and constructed in accordance with the provisions of this Section R614.

"This Section shall supersede the limitations of Section R301.2.2 and structures complying with the provisions of Section R614 shall have complied with the seismic requirements of this code.

"Exception: Structures with any site conditions may be designed with accepted engineering practice for earthen wall structures and the provisions of the IBC Section 2114 as amended.

"R614.1.1 Earthen materials. This section shall establish minimum standards for safety for construction of earthen materials structures, collectively known as adobe, rammed earth, and hydraulic pressed unit construction.

"R614.1.2 Professional registration not required. When the empirical design provisions of this section are used to design wall systems, project drawings, typical details and specifications are not required to bear the seal of an architect or engineer, unless otherwise required by the state law of the jurisdiction having authority or as required by Section R614.1.3.

"R614.1.3 Professional registration required. When the earthen structure is over 12 feet (3638 mm) in height, as measured by Table R602.2.1, or is over 1 story, the plans and specifications shall be prepared by a registered professional architect or engineer licensed in the state for which the project is to be constructed. All such projects shall be designed in accordance with accepted engineering practice for earthen wall structures and in accordance the International Building Code Section 2114 as amended.

"R614.2 Dimensions of earth walls. The actual measured thickness of earthen walls shall conform to the requirements of Section R614.

"R614.2.1 Thickness and Height. The minimum thickness and maximum height of earthen walls and parapets shall be in accordance with Tables R614.2.1 (1 to 6) based upon the Sds value for the site of the project. Wall thickness shall be measured from face to face of walls with concave joints. Walls with rake joints shall be measured surface of joint to surface of joint. The thickness of wall sections shall not be combined without full cross bonding of the masonry units throughout the wall.

"Exception: Walls supported only at ground level and only supported at the base of the wall shall be limited to a height of ½ that allowed by Tables R614.2.1 (1 to 6).

"R614.2.2 Maximum length. The maximum length of any earthen wall laterally braced by Bond Beams per Section R614.5.2 shall be 20 feet (6,096 mm) between perpendicular bracing walls. Any wall in excess of 20 feet (6,096 mm) shall be designed in accordance with the amended IBC as noted in Section R614.1 above, (See Section R614.7 for required lengths of solid shear panels in walls.), or braced by a roof diaphragm roof system as required by Section R614.5.2.3.

"R614.3 Support conditions. Earthen walls shall be supported on a solid concrete, solid masonry foundation system the width of which shall be not greater than 1/2 inch narrower than the earthen wall which it supports. Earthen structures shall not be less than 6 inches above adjacent grade.

"R614.3.1 Moisture barrier. A moisture barrier equal to 30 lb. asphalt impregnated building paper, or equivalent moisture resistant barrier, shall be installed between the supporting foundation and the earthen wall material.

"R614.4 Allowable stresses. Allowable compressive, tensile and shear stresses in earthen walls shall not exceed the values prescribed in Table R614.4. In determining the stresses in masonry, the effects of all loads and conditions of loading and the influence of all forces affecting the design and strength of the several parts shall be taken into account. Bolts in shear shall be limited to those values in IBC Table 2114.6.B.

"R614.4.1 Combined units. In walls composed of different kinds or grades of units, materials or mortars, the maximum stress shall not exceed the allowable stress for the weakest of the combination of units, materials and mortars of which the wall is composed. The net thickness of any facing unit of earthen materials used to resist stress shall not be less than 3 inches (76.2 mm).

"When dissimilar materials, (e.g. concrete masonry or steel) are used to support earth wall construction, such elements shall be structurally isolated from other earth wall elements. The

design shall recognize, with specific detailing, the effects shrinkage of the earth wall construction may have on the structural integrity of the structure.

**"TABLE R614.4
ALLOWABLE STRESSES FOR EMPIRICAL DESIGN OF EARTHEN WALL STRUCTURES**

ALLOWABLE STRESSES			
STRENGTH OF UNIT, GROSS AREA		GROSS CROSS-SECTIONAL AREA NOTE 1	
Compression	300 psi	Normal Loading	30 psi
		Concentrated Loading	30 psi
Modulus of rupture	55 psi	Allowable tension without tensile reinforcing	0 psi
Shear	n.a.	With special inspection	8 psi
		Without special inspection	4 psi
Modulus of Elasticity	60,000 psi	Allowable deflection	Less than 1/2%

For SI: 1 pound per square inch = 6.895 kPa.

Note: 1. Gross cross-sectional area shall be calculated on the actual rather than the nominal dimensions.

"R614.5 Lateral support. Earthen walls constructed of earthen units shall be bonded and tied to intersecting earthen walls and laterally supported in the vertical direction in accordance with one of the methods in Section R614.5.2 or Section R614.5.3.

"R614.5.2 Bond Beams. A continuous concrete bond beam system embedded in the earthen walls, designed to provide lateral support for the walls without the aid of additional bracing elements such as roof diaphragm. Bond beams shall be not less than the width of the wall minus 6 inches (152.4 mm) and a height of not less than 8 inches. Bond beams shall be reinforced as required by Tables R614.2.1 (1 to 6). Bars shall be placed not more than 1 1/2" from the inside face of the form or veneer block.

"R614.5.2.2.1 Bond beam anchorage. Bond beams shall be anchored to earthen walls at intervals of not over 48 inches (1219 mm) by a connection with shear strength of not less than 200 lbs. per lineal foot plus an additional 25 lbs. per lineal foot for every inch of thickness in excess of 16" thick.

"R614.5.3 Roof diaphragm. A roof diaphragm complying with other provisions of this code adequate to provide not less than 200 lbs. per lineal foot of lateral support may be used to brace earthen walls. Earthen walls shall be anchored to roof diaphragms with connections to resist loads of not less than 200 lbs. per lineal foot plus an additional 25 lbs. per lineal foot for every inch of thickness in excess of 16" thick. This anchorage shall be tie beams as specified in Section R614.5.3.2 or other anchorage methods of equal strength.

"R614.5.3.1 Tie beams. A tie beam is a concrete or masonry, beam built into the earthen wall for the purpose of anchoring the roof diaphragm and transferring the lateral perpendicular and parallel forces. Tie beams shall be provided for all earthen walls laterally braced by a roof diaphragm. Tie beams shall be anchored to the roof diaphragm system as required by other provisions in this code at intervals not exceeding 4 feet (1219 mm).

"Tie beams shall be not less than 1/2 the width of the earthen wall, a minimum of 8 inches (203.2 mm) high and reinforced with 2 - #4 reinforcing bars.

"R614.5.3.2 Tie beam anchorage. Tie beams shall be anchored to earthen walls at intervals of not over 48 inches (1219 mm) by a connection with shear strength of not less than 200 lbs. per lineal foot plus an additional 25 lbs. per lineal foot for every inch of thickness in excess of 16" thick.

"R614.6 Lintels. Earthen walls over openings shall be supported by steel lintels, reinforced concrete or masonry lintels or earthen arches designed to support load imposed. Lintels shall not be supported by rigid structural columns, frames or posts with rigidities greater than the earthen wall unless the design allows for the potential for differential settlements.

"Small openings less than 12" may be constructed without structural lintels.

"R614.7 Shear walls. earthen walls subject to in-plane loads shall be designed with at least one earthen wall shear panel, at least 4 feet long, free of openings, with a length as computed by formula R614.7-1.

$$L = (\sqrt{PL \times Sds \times 4}) \quad \text{(Equation R614.7-1)}$$

"where:

"L = Length of shear panel

"PL = Sum of overall length of walls perpendicular to the panel.

"Sds = Sds factor as determined by Section 1615 of the International Building Code.

"R614.8 Jambs at openings. Portions of walls between openings or corner shall be constructed with lengths of not less than 1 ½ times the thickness of the wall in which they occur.

"R614.9 Piers. The thickness of isolated earthen piers shall be not less than 1 ½ times those wall thickness values indicated in Table R614.2.1(1 to 6). When structural posts or columns are provided within the pier ties or attachments shall be provided to the earthen wall system to laterally secure it as required by Section R614.11.

"R614.9.1 Pier Cap. A solid concrete cap shall be provided at the top of load bearing piers under all concentrated loads. The cap shall cover not less than 50% of the top of the pier.

"R614.10 Chases. Chases and recesses in earthen walls shall not be deeper than one-half the thickness of the wall thickness. The maximum length of a horizontal chase or horizontal projection shall not exceed 4 feet (1219 mm), and shall have at least 8 inches (203.2 mm) of masonry in back of the chases and recesses and between adjacent chases or recesses and the jambs of openings.

"Chases and recesses in earthen walls shall be designed and constructed so as not to reduce the required strength or required fire resistance of the wall and in no case shall a chase or recess be permitted within the required area of a pier. Masonry directly above chases or recesses wider than 12 inches (304.8 mm) shall be supported on noncombustible lintels.

"R614.11 Stack bond. When the earthen wall is constructed of units, (e.g. adobe brick), units shall not be laid in stack bond. Units shall, in all locations throughout the wall system, overlap the courses below by not less than one-third the dimension of the units.

"R614.12 Metal reinforcement. In addition to bonding earthen walls shall be anchored at their intersections, all walls shall be reinforced with joint reinforcement at vertical intervals of not more than 16 inches (406.4 mm). Horizontal reinforcement shall be continuous at the intersections. Reinforcement shall be not more than 4 inches narrower than the wall thickness.

"R614.13 Veneer. All veneers using earthen materials shall be installed in accordance with this section. Such veneers shall be installed with a noncombustible foundation, over concrete masonry, a backing of wood or cold-formed steel and shall be limited to the first story above grade and be not less than 4 inches (101.6 mm) or greater than 8 inches (203.2 mm) in thickness. Veneers shall not exceed a height of over 20 times their thickness without structural vertical support.

"R614.13.1 Anchorage. Earth units shall be anchored to the supporting wall with a corrosion-resistant veneer tie system mechanically attached to continuous horizontal joint reinforcement continuously installed in the veneer bed joint not less than 16 inches (406.4 mm) on center vertically. When earth mortar systems are used the tie system shall prevent the accumulation of mortar at the base of the veneer. Conventional brick ties shall not be used to anchor earth units.

"R614.13.2 Air space. The veneer shall be separated from the sheathing by an air space of a minimum of 1 inch (25.4 mm) but not more than 2 inches (50.8 mm). A moisture-resistant barrier or 15 lb. asphalt-saturated felt as required by Section R703.2 shall be provided except when veneer is applied over concrete masonry or concrete backing.

"R614.13.3 Flashing. Approved corrosion-resistive flashing shall be provided in the exterior wall envelop in such a manner as to prevent entry of water into the wall cavity or penetration of water into the building structural framing components. The flashing shall extend to the surface of the exterior wall finish and shall be installed to prevent water from reentering the exterior wall envelope. Flashing shall be located beneath the first course of veneer, and at other points of support, including structural floors, shelf angles and lintels. Approved corrosion-resisting flashing shall be installed at all of the following locations:

- "1. At top of all exterior window and door openings in such a manner as to be leak proof.
- "2. At the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings.
- "3. Under and at the ends of masonry, wood or metal copings and sills.
- "4. Where exterior porches, decks or stairs attach to a wall or floor assembly of wood-frame construction.
- "5. At wall and roof intersections.

"R614.13.4 Weep holes. Weep holes shall be provided in the outside withe of masonry walls at a maximum spacing of 33 inches (838.2 mm) on center. Weep holes shall not be less than 3/16 inches (4.76 mm) in diameter. Weep holes shall be located immediately above the flashing.

"R614.13.5 Plaster veneer. Both interior and exterior faces of earthen walls which are to be plastered with cement plaster shall be lathed and plastered in accordance the Section R703.6.1.

"R614.14 Buttresses. Earthen walls used as buttresses shall not extend beyond an average length perpendicular to the wall to be braced a distance of 6 feet (1829 mm) without consideration to out-of-plane bending of the buttress.

"R614.15 Gable end walls. Gable end walls shall be constructed using veneer construction as required by Section 613.11 or shall be provided with lateral bracing to prevent overturn designed in accordance with the IBC as modified.

"R614.16 Ledgers. Ledgers shall not be used to support vertical live and dead loads in excess of 75 lbs. per lineal foot.

"R614.17 Construction documents. In addition to the provisions of Section R106 all plans for earthen structures shall include the following:

- "1. The Sds number of the site.
- "2. The wind speed and site exposure coefficient of the site.
- "3. The material standard to which the earthen materials will comply.
- "4. The foundation supporting system and moisture barrier material.
- "5. The length, height and thickness in the actual dimensions of all earthen walls and parapets.
- "6. The bond beam or tie beam construction and attachment method to the earthen wall.
- "7. Lintel design, construction and end bearing area.
- "8. Veneer dimensions, attachment methods, moisture barrier and supporting structure.
- "9. Flashing materials and installation.
- "10. Metal reinforcement type and location.

"R614.18 Corbeled wall elements. The maximum corbeled projection beyond the face of the wall shall not be more than one fourth of the wall thickness.

"R614.19 Material standards. The materials used in earthen wall structures shall comply with the following material standards. For each of the tests prescribed in these standards, five full size sample units shall be selected at random from each lot of units of fraction thereof produced. Mass wall systems such as rammed earth shall provide a five tests for each required standard test series.

"R614.19.1 Manufacturers of earthen materials. Established manufacturers of earthen materials shall certify compliance with these standards. Copies of their periodic testing shall be supplied to the building official when requested. Literature, advertising and other information supplied by the manufacturer to designers and users of earthen materials shall include the actual dimensions of units, not nominal dimensions.

"R614.19.2 Onsite earthen materials. Earthen units, mortar, rammed earth wall materials mined, mixed, formulated, and or molded on site shall be tested for compliance with these standards. For individual structures, a set of tests shall be provided for the first 2500 square feet of wall and an additional test for each additional 2500 square feet or portion thereof in the structure. At least one set of tests shall be made for each structure and for each 2500 square feet of patio wall. The fabricator of the materials used in the project shall certify in writing to the building official compliance with these standards. The certification shall include the number of units site molded, size of the units, volume of material used as mortar, dates of fabrication, and results of testing of the material. If materials from established manufacturers and onsite materials are used in the project, copies of records including sources, quantities, and location of use within the structure shall be provided to the building official upon request.

"R614.19.3 Categories of earthen materials. Type I, II, III, and IV earthen materials are approved for use in construction of projects designed in accordance with Section 2114.

"Exception: Type I adobe shall only be used for repairs and small additions in which new walls do not exceed 10% of the surface area of existing walls of Type I construction and for structures constructed of a similar material system and for projects requiring this class of materials to meet historic guidelines.

"R614.19.3.1 Required plaster veneer. Adobe of Type I and II shall be protected on the exterior with exterior plaster meeting the requirements of IBC Section 2512 applied over wire lath. Type I and II adobe shall not be used within 4 inches (101.6 mm) of the floor or at the top of parapet walls or near potential sources of water which may effect the stability of the earth wall system. Other Types of adobe may be left unplastered and may be used without separation from the floor.

"R614.19.3.2 Adobe units and mortar. Moisture resistant stabilized adobe units and mortar shall meet the following testing standards as indicated in Table. Type S Portland cement mortar may be used for Type II, III, and IV adobe in lieu of earth mortar.

"Table R614.19.3.2

Material Type	Dry Compression R614.19.3.2.1	Wet Compression R614.19.3.2.2	Modulus of Rupture R614.19.3.1.3	Absorption <2.5% R614.19.3.2.4	Absorption <5.0% R614.19.3.2.5	Moisture Content R614.19.3.2.6
I	X		X			X
II	X		X		X	X
III	X		X	X		X
IV		X	X			X

"X Indicates that material must pass the test standards prescribed in this Section.

"R614.19.3.2.1 Dry compression strength. Determine the compressive strength of the required number of samples as required by Section R614.19. in accordance with the following procedures.

"R614.19.3.2.1.1 Dry the Specimen. Dry the specimen at a temperature of 85o F.+/-15o F. (29o C. +/- 9o) in an atmosphere having relative humidity of not more than 50 percent. Weigh the specimen at one-day intervals until constant weight is attained.

"R614.19.3.2.1.2 Cap the Specimen. The specimen may be suitably capped with calcined gypsum mortar or the bearing surfaces may be rubbed smooth and true. Then calcined gypsum is used for capping, conduct the test after the capping has set and the specimen has been dried to constant weight in accordance with Item 1 of this section.

"R614.19.3.2.1.3 Test the Specimen. Test the specimens in the position in which the earthen unit is designed to be used. And bed on and cap with a felt pad not less than 1/8 inch (3.2mm) or more than ¼ inch (6.4 mm) in thickness.

"R614.19.3.2.1.4 Testing Equipment. The loading head shall completely cover the bearing area of the specimen and the applied load shall be transmitted through a spherical bearing block of proper design. The speed of the moving head of the testing machine shall not be more than 0.05 inch (1.27 mm) per minute.

"R614.19.3.1.5 Reporting Results. Calculate the average compressive strength of the specimens tested and report this as the compressive strength of the block. Units shall have an average dry compressive strength of 300 psi (2068 kPa) and no individual unit may have a strength of less than 250 psi. (1724 kPa).

"R614.19.3.2.2 Wet compression strength. Determine the compressive strength of the required number of specimen as required by Section R614.19. in accordance with the following procedures.

"R614.19.3.2.2.1 Cap the Specimen. The specimens may be suitably capped with a capping material compatible with water saturation or the bearing surfaces may be rubbed smooth and true.

"R614.19.3.2.2.2 Wetting the Specimen. Submerge the specimen under water for not less than 8 hours or longer as required until fully saturated.

"R614.19.3.2.2.3 Test the Specimen. Immediately test the specimen in the position in which the earthen unit is designed to be used. And bed on and cap with a felt pad not less than 1/8 inch (3.2 mm) or more than ¼ inch (6.4 mm) in thickness.

"R614.19.3.2.2.4 Testing Equipment. The loading head shall completely cover the bearing area of the specimen and the applied load shall be transmitted through a spherical bearing block of proper design. The speed of the moving head of the testing machine shall not be more than 0.05 inch (1.27 mm) per minute.

"R614.19.3.2.2.5. Reporting Results. Calculate the average compressive strength of the specimens tested and report this as the compressive strength of the block. Adobe units shall have an average wet compressive strength of 300 psi (2068 kPa). Five samples shall be tested and no individual unit may have a wet compressive strength of less than 250 psi. (1724 kPa).

"R614.19.3.2.3 Modulus of rupture. Adobe units shall have an average modulus of rupture of 50 psi (345 kPa) when tested in accordance with the following procedure. Five samples shall be tested and no individual unit shall have a modulus of rupture of less than 35 psi (241 kPa).

"R614.19.3.2.3.1 Support conditions. A cured unit shall be simply supported by 2-inch-diameter (50.8 mm) cylindrical supports located 2 inches (50.8 mm) in from each end and extending the full width of the unit.

"R614.19.3.2.3.2 Loading conditions. A 2-inch-diameter (50.8 mm) cylinder shall be placed at mid-span parallel to the supports.

"R614.19.3.2.3.3 Testing procedure. A vertical load shall be applied to the cylinder at the rate of 500 pounds per minute (37 N/s) until failure occurs.

"R614.19.3.2.3.4 Modulus of rupture determination. The modulus of rupture shall be determined by the formula:

$$f_r = 3WL_s / 2bT^2 \quad \text{(Equation 2116.3.2.3.4-1)}$$

"where, for the purposes of this section only:

"b = Width of the test specimen measured parallel to the loading cylinder, inches (mm).

"f_r = Modulus of rupture, psi (Mpa).

"L_s = Distance between supports, inches (mm).

"T = Thickness of the test specimen measured parallel to the direction of load, inches (mm).

"W = The applied load at failure, pounds (N).

"R614.19.3.2.4 Absorption less than 2.5%. A 4-inch (101.6 mm) cube, cut from an adobe unit fired to a constant weight in a ventilated oven at 212 degrees F to 239 degrees F , shall not absorb more than 2 ½ percent moisture by weight when placed upon a constantly water-saturated, porous surface for 7 days. A minimum of five specimens shall be tested and each specimen shall be cut from a separate unit.

"R614.19.3.2.5 Absorption less than 5.0%. A 4-inch (101.6 mm) cube, cut from an adobe unit fired to a constant weight in a ventilated oven at 212 degrees F to 239 degrees F , shall not absorb more than 2 ½ percent moisture by weight when placed upon a constantly water-saturated, porous surface for 7 days. A minimum of five specimens shall be tested and each specimen shall be cut from a separate unit.

"R614.19.3.2.6 Additional Requirements. All earthen units shall meet the following requirements.

"R614.19.3.2.6.1 Moisture content requirements. Earthen units shall have a moisture content not exceeding 4 percent by weight at the time of use.

"R614.19.3.2.6.2 Shrinkage cracks. All earthen units shall not contain more than three shrinkage cracks and any single shrinkage crack shall not exceed 3 inches (76.2 mm) in length or 1/8 inch (3.2 mm) in width.

"R614.19.3.2.6.3 Soil requirements. Soil used for moisture resisting adobe units and mortar shall be chemically compatible with the stabilizing material. The soil shall contain sufficient clay to bind the particles together without the aid of stabilizers. The soil shall contain not more than 0.2 percent of water-soluble salts.

"R614.19.3.3 Cement Stabilized Rammed Earth. Cement stabilized Rammed Earth shall meet the following standards. The installer of the wall system shall comply with the requirements of Section 2114.14.2 for frequency of testing.

"R614.19.3.3.1 Testing before Construction. The installer of cement stabilized Rammed Earth shall provide the following testing before issuance of a building permit.

"R614.19.3.3.2 Materials from a Licensed Sand and Gravel Producer. A copy of Proctor ASTM D 698 shall be provided for each soil type and source or combination of sources. Periodic testing as provided by the supplier may be supplied to meet this requirement. The soil contain not more than 0.2 percent of water-soluble salts.

"R614.19.3.3.3 Material Mined and Mixed on Site. A copy of ASTM D 698, ASTM C 117, ASTM C 136, and ASTM D 4318 shall be provide for each soil type and source or combination of sources. Such tests shall be repeated as required to assure that all materials to be used have been tested and are represented by the tests. The soil shall contain not more than 0.2 percent of water-soluble salts.

"R614.19.3.3.4 Testing required during Construction. The installer of cement stabilized Rammed Earth shall provide the following tests made during the construction process. A certified testing laboratory shall provide field density tests for comparison to the preconstruction Proctor ASTM D 698, percent moisture ASTM D 2216, dry density ASTM D 698, and percent moisture ASTM D 1556.

"Cement Stabilized Rammed Earth walls shall meet or exceed 95% maximum dry density (ASTM D 698). Samples taken from the wall shall exceed 300 psi compression (ASTM D 1633) 14 days after placement."

Table R702.3.5. MINIMUM THICKNESS AND APPLICATION OF GYPSUM BOARD REQUIREMENTS.

[§ Table R702.3.5. is hereby amended as follows:]

**"TABLE R702.3.5
MINIMUM THICKNESS AND APPLICATION OF GYPSUM BOARD**

THICKNESS OF GYPSUM BOARD (inches)	APPLICATION	ORIENTATION OF GYPSUM BOARD TO FRAMING	MAXIMUM SPACING OF FRAMING MEMBERS (inches o.c.)	MAXIMUM SPACING OF FASTENERS (inches)		SIZE OF NAILS FOR APPLICATION TO WOOD FRAMING ^c
				Nails ^a	Screws ^b	
1/2	Ceiling	Either direction	16	7	12	13 gage, 1-3/8" long, 19/64" head; 0.098" diameter, 1-1/4" long, annular-ringed; 5d cooler nail, 0.086" diameter, 1-5/8" long, 15/64" head; or gypsum board nail, 0.086" diameter, 1-5/8" long, 9/32" head.
	Ceiling ^d	Perpendicular	24	7	12	
	Wall	Either direction	24	8	12	
	Wall	Either direction	16	8	16	
5/8	Ceiling	Either direction	16	7	12	13 gage, 1-5/8" long, 19/64" head; 0.098" diameter, 1-3/8" long, annular-ringed; 6d cooler nail, 0.092" diameter, 1-7/8" long, 1/4" head; or gypsum board nail 0.0915" diameter, 1-7/8" long, 19/64" head.
	Ceiling ^e	Perpendicular	24	7	12	
	Wall	Either direction	24	8	12	
	Wall	Either direction	16	8	16	
Application with adhesive						
1/2 or 5/8	Ceiling	Perpendicular	16	16	16	Same as above for 1/2" and 5/8" gypsum board, respectively
	Ceiling ^d	Either direction	24	12	16	
	Wall	Either direction	24	16	24	

For SI: 1 inch = 25.4 mm.

- For application without adhesive, a pair of nails spaced not less than 2 inches apart or more than 2-1/2 inches apart may be used with the pair of nails spaced 12 inches on center.
- Screws shall be Type S or W per ASTM C 1002 and shall be sufficiently long to penetrate wood framing not less than 5/8 inch and metal framing not less than 3/8 inch.
- Where metal framing is used with a clinching design to receive nails by two edges of metal, the nails shall be not less than 5/8 inch longer than the gypsum board thickness and shall have ringed shanks. Where the metal framing has a nailing groove formed to receive the nails, the nails shall have barbed shanks or be 5d, 13-1/2 gage, 1-5/8 inches long, 1-5/64 inch head for 1/2 inch gypsum board; and 6d, 13 gage, 1-7/8 inches long, 15/64 inch head for 5/8 inch gypsum board.
- On ceiling applications to receive a water-based texture material, either hand or spray applied, the gypsum board shall be applied perpendicular to framing. When applying a water-based texture material, the minimum gypsum board thickness shall be 1/2-inch for 16-inch on center framing and 5/8 inch for 24 inch on center framing or 1/2 -inch sag-resistant gypsum ceiling board shall be used.
- Type X gypsum board for garage ceilings beneath habitable rooms shall be installed perpendicular to the ceiling framing and shall be fastened at maximum 6 inches o.c. by minimum 1-7/8 inches 6d coated nails or equivalent drywall screws.

Sec. R903. WEATHER PROTECTION.

[§ R903.4.1 is hereby amended as follows:]

"Section R903.4.1. *Overflow drains and scuppers.* The installation and sizing of overflow drains, leaders and conductors shall comply with the Plumbing Code."

Sec. R1007. CLEAN BURNING FIREPLACES.

[§ R1007 is hereby added as follows:]

"SECTION R1007. CLEAN BURNING FIREPLACES

"R1007.1 Clean Burning Fireplaces. The purpose of this Standard is to regulate fireplaces, woodstoves, or other solid-fuel burning devices to reduce the amount of air pollution caused by particulate matter and carbon monoxide.

The effective date of the regulations and prohibitions set forth in this Standard took effect on December 31, 1998.

"Definitions: For purposes of this Standard, the following words and terms shall be defined as follows:

"FIREPLACE means a built in place masonry hearth and fire chamber or a factory-built appliance, designed to burn solid fuel or to accommodate gas or electric log insert or similar device, and which is intended for occasional recreational or aesthetic use, not for cooking, heating, or industrial processes.

"SOLID FUEL includes but is not limited to wood, coal, or other nongaseous or non-liquid fuels, including those fuels defined by the Maricopa County Air Pollution Control Officer as "inappropriate fuel" to burn in residential wood-burning devices.

"WOODSTOVE means a solid-fuel burning heating appliance including a pellet stove, which is either freestanding or designed to be inserted into a fireplace.

Installation Restrictions:

"R1007.2 On or after the effective date, no person, firm or corporation shall construct or install a fireplace or a woodstove, and the Building Official shall not approve or issue a permit to construct or install a fireplace or a woodstove, unless the fireplace or woodstove complied with one of the following:

- "1. A fireplace which has a permanently installed gas or electric log insert.
- "2. A fireplace, woodstove, or other solid-fuel burning appliance which has been certified by the United States Environmental Protection Agency as conforming to 40 Code of Federal Regulations Part 60, Subpart AAA as in effect on July 1, 1990.
- "3. A fireplace, woodstove or other solid-fuel burning appliance which has been tested and listed by a nationally recognized testing agency to meet performance standards equivalent to those adopted by 40 Code of Federal Regulations part 60, Subpart AAA as in effect on July 1, 1990.
- "4. A fireplace, woodstove or other solid-fuel burning appliance which has been determined by the Maricopa County Air Pollution Control Officer to meet performance standards equivalent to those adopted by 40 Code of Federal Regulations part 60, Subpart AAA as in effect on July 1, 1990.
- "5. A fireplace which has a permanently installed woodstove insert which complies with subparagraphs 2, 3, or 4 above.

"R1007.3 The following installations are not regulated by this Standard and are not prohibited by this Standard:

- "1. Furnace, boilers, incinerators, kilns, and other similar space heating or industrial process equipment.

"2. Cook-stoves, barbecue grills, and similar appliances designed primarily for cooking.

"3. Fire pits, barbecue grills, and other outdoor fireplaces.

"R1007.4 Fireplace or Woodstove Alterations Prohibited:

"R1007.4 .1 On or after the effective date, no person, firm or corporation shall alter or remove a gas or electric log insert or a woodstove insert from a fireplace for purposes of converting the fireplace to directly burn wood or other solid fuel.

"R1007.4 .2 On or after the effective date, no person, firm or corporation shall alter a fireplace, woodstove or other solid fuel burning appliance in any manner that would void it's certification or operational compliance with the provisions of this Standard.

"R1007.5 Permits Required. In addition to the provisions and restrictions of this Standard, construction, installation or alternation of all fireplaces, woodstoves and other gas, electric or solid-fuel burning appliances and equipment shall be done in compliance with provisions of this Code and shall be subject to the permits and inspections."

Sec. M1307. APPLIANCE INSTALLATION.

[§ M1307.3 is hereby amended by adding exceptions as follows:]

"*Section M1307.3. Elevation of ignition source.* Appliances having an ignition source shall be elevated such that the source of ignition is not less than 18 inches (457 mm) above the floor in garages. For the purpose of this section, rooms or spaces that are not part of the living space of a dwelling unit and that communicate with a private garage through openings shall be considered to be part of the private garage.

"Exceptions:

"1. Elevation of the ignition source is not required for appliances that are listed as flammable vapor resistant and for installation without elevation.

"2. Direct-vent appliances that obtain all combustion air directly from the outdoors.

"3. Clothes dryers installed in private garages."

Sec. M1307. APPLIANCE INSTALLATION.

[§ M1307.6 is hereby added as follows:]

"*Section M1307.6. Liquefied Petroleum Appliances.* LPG appliances shall not be installed in an attic, pit or other location that would cause a ponding or retention of gas."

Sec. M1403. HEATPUMP EQUIPMENT.

[§ M1403.2 is hereby amended as follows:]

"Section M1403.2. Foundations and supports. Supports and foundations for outdoor mechanical systems shall be raised at least 3 inches (76 mm) above the finished grade, and shall conform to the manufacturer's installation instructions."

Sec. M1411. REFRIGERATION COOLING EQUIPMENT.

[§ M1411.3.2 is hereby amended as follows:]

"Section M1411.3.2. Drain Pipe materials and sizes. Components of the condensate disposal system shall be cast iron, galvanized steel, copper, polybutylene, polyethylene, ABS, CPVC or PVC pipe or tubing. All components shall be selected for the pressure and temperature rating of the installation. Condensate waste and drain line size shall not be less than $\frac{3}{4}$ inch (91 mm) internal diameter and shall not decrease in size from the drain pan connection to the place of condensate disposal. Where the drain pipes from more than one unit are manifolded together for condensate drainage, the pipe or tubing shall be sized in accordance with an approved method. All horizontal sections shall be installed with a uniform alignment at a uniform slope in the direction of discharge of not less than one-eighth unit vertical in 12 units' horizontal (one-percent slope)."

Sec. M1701. GENERAL.

[§ M1701.4 is hereby amended as follows:]

"Section M1701.4. Prohibited sources. Combustion air ducts and openings shall not connect appliance enclosures with space in which the operation of a fan may adversely affect the flow of combustion air. Combustion air shall not be obtained from an area in which flammable vapors present a hazard. Fuel-fired appliances shall not obtain combustion air from any of the following rooms or spaces:

"1. Sleeping rooms.

"2. Bathrooms.

"3. Toilet rooms.

"Exception: The following appliances may be located in sleeping rooms, bathrooms and toilet rooms:

"1. Appliances installed in an enclosure in which all combustion air is taken from the outdoors and the enclosure is equipped with a solid weather-stripped door and self-closing device.

"2. Direct-vent appliances that obtain all combustion air directly from the outdoors."

Sec. M1703. ALL AIR FROM OUTDOORS.

[§ M1703.2 is hereby amended as follows:]

"Section M1703.2. *Two openings or ducts.* Outside combustion air shall be supplied through openings or ducts, as illustrated in Figures M1703.2 (1), M1703.2 (2), M1703.2 (3) and M1703.2 (4). One opening shall be within 12 inches (305mm) of the top of the enclosure, and one within 12 inches (305mm) of the bottom of the enclosure. For LPG appliances, any duct serving the lower opening shall be at the floor level and slope to the outdoors without traps or pockets. Openings are permitted to connect to spaces directly communicating with the outdoors, such as ventilated crawl spaces or ventilated attic spaces. The same duct or opening shall not serve both combustion air openings. The duct serving the upper opening shall be level or extend upward from the appliance."

Sec. G2406. APPLIANCE LOCATION.

[§ G2406.2 (303.3) is hereby amended by adding 5. as follows:]

"5. Liquefied Petroleum (LPG) appliances shall not be installed in an attic, pit or other location that would cause ponding or retention of gas."

Sec. G2408. INSTALLATION.

[§ G2408.2 (305.3), exception is hereby amended as follows:]

"Exceptions:

- "1. Elevation of the ignition source is not required for appliances that are listed as flammable vapor resistant and for installation without elevation.
- "2. Direct-vent appliances that obtain all combustion air directly from the outdoors.
- "3. Clothes dryers installed in private garages."

Sec. G2415. PIPING SYSTEM INSTALLATION.

[§ G2415.9 (404.9) is hereby amended as follows:]

"Section G2415.9 (404.9). *Minimum burial depth.* Underground piping systems shall be installed a minimum depth of 12 inches (305 mm) below grade, for metal, and 18 inches for plastic piping."

Sec. G2415. PIPING SYSTEM INSTALLATION.

[§ G2415.91 (404.9.1) is hereby repealed:]

Sec. G2417. INSPECTION, TESTING AND PURGING.

[§ G2417.4 (406.4) is hereby amended as follows:]

"Section G2417.4. *Test pressure measurement.* Test pressure shall be measured with a manometer or with a pressure-measuring device designed and calibrated to read, record, or indicate a pressure loss caused by leakage during the pressure test period. The source of pressure shall be isolated before the pressure tests are made.

"G2417.4.1 Test pressure. The test pressure to be used shall be no less than ten (10) pounds per square inch (69 kPa) gauge pressure, or where approved by the Building Official, the piping and valves may be tested at a pressure of at least six (6) inches (152.4 mm) of mercury, measured with a manometer or slope gauge. For welded piping, and for piping carrying gas at pressures in excess of fourteen (14) inches (0.4m) water column pressure, the test pressure shall be no less than sixty (60) pounds per square inch (413 kPa). Where the test pressure exceeds 125 psig (862 kPa gauge), the test pressure shall not exceed a value that produces a hoop stress in the piping greater than 50 percent of the specified minimum yield strength of the pipe.

"G2417.4.2 Test duration. Test duration shall be not less fifteen (15) minutes or for welded pipe and piping carrying gas at pressures in excess of fourteen (14) inches (0.4m) water column pressure, the test duration shall be not less than thirty (30) minutes. The duration of the test shall not be required to exceed 24 hours.

"G2417.4.3 Test Gauges. Tests required by this Code which are performed utilizing dial gauges shall be limited to gauges having the following pressure increments or graduations.

"G2417.4.3.1. Required pressure tests of ten (10) pounds (69 kPa) or less shall be performed with gauges having increments of one-tenth (1/10) pound (0.69 kPa) or less.

"G2417.4.3.2. Required pressure tests exceeding ten (10) pounds (69 kPa) but less than one hundred (100) pounds (690 kPa) shall be performed with gauges having increments of one (1) pound (7 kPa) or less.

"G2417.4.3.3. Required pressure tests exceeding one hundred (100) pounds (690 kPa) shall be performed with gauges having increments 2 psi (14 kPa) or less.

"G2417.4.3.4 Pressure tests required by this code, which are performed utilizing dial gauges, shall be limited to a gauge having a maximum gauge rating not exceeding twice the applied test pressure."

Sec. P2503. INSPECTION AND TESTS.

[§ P2503.6 is hereby amended as follows:]

"*Section 2503.6. Water-supply system testing.* Upon completion of the water-supply system or a section thereof, the system, or portion completed, shall be tested and proved tight under a water pressure not less than the working pressure of the system; or, for piping systems other than plastic, by an air test of not less than 50 psi (344 kPa). This pressure shall be held for a test period of at least 15 minutes. The water used for tests shall be obtained from a potable source of supply."

Sec. P2503. INSPECTION AND TESTS.

[§ P2503.8 is hereby amended as follows:]

"*Section P2503.8. Test gauges.* Gauges used for testing shall be as follows:

- "1. Tests requiring a pressure of 10 psi or less shall utilize a testing gauge having increments of 0.10 psi or less.
- "2. Tests requiring a pressure of 10 psi but less than or equal to 100 psi shall utilize a testing gauge having increments of 1 psi or less.
- "3. Tests requiring a pressure of greater than 100 psi shall utilize a testing gauge having increments of 2 psi or less.

"Pressure tests required by this code, which are performed utilizing dial gauges, shall be limited to a gauge having a maximum gauge rating not exceeding twice the applied test pressure."

Sec. P2603. STRUCTURAL AND PIPING PROTECTION.

[§ P2603.6.1 is hereby amended as follows:]

"*Section P2603.6.1. Sewer depth.* Building sewers shall be a minimum of 12 inches (305 mm) below grade."

Sec. P2801. GENERAL.

[§ P2801.5.1 is hereby amended as follows:]

"*Section P2801.5.1. Pan size and drain.* The pan shall not be less than 1.5 inches (38 mm) deep and shall be of sufficient size and shape to receive all dripping or condensate from the tank or water heater. The pan shall be drained by an indirect waste pipe having a minimum diameter of $\frac{3}{4}$ inch (19 mm) installed with a uniform alignment at a uniform slope in the direction of discharge of not less than one-eighth unit vertical in 12 units' horizontal (one-percent slope)."

Sec. P2803. RELIF VALVES.

[§ P2803.6.1 is hereby amended as follows:]

"*Section P2803.6.1. Requirements of discharge pipe.* The relief valve shall discharge full size to an approved place of disposal such as outside the building or an indirect waste receptor. The discharge pipe shall not have any trapped sections, shall be installed to drain by gravity flow and shall terminate atmospherically not less than 6 inches (152 mm) nor more than 24 inches (610 mm) above the floor or finish grade pointing downward. The outlet end of the discharge pipe shall not be threaded and such discharge pipe shall not have a valve or tee installed."

Table P2902. APPLICATION FOR BACKFLOW PREVENTERS.

[§ Table P2902.2 is hereby amended as follows:]

**"TABLE P2902.2
APPLICATION FOR BACKFLOW PREVENTERS**

DEVICE	DEGREE OF HAZARD ^a	APPLICATION ^b	APPLICABLE STANDARDS
Air gap	High or low hazard	Backsiphonage or backpressure	ASME A112.1.2
Air gap fittings for use with plumbing fixtures, appliances and appurtenances	High or low hazard	Backsiphonage or backpressure	ASME A112.1.3
Antisiphon-type fill valves for gravity water closet flush tanks	High hazard	Backsiphonage only	ASSE 1002 CSA CAN/CSA B125
Backflow preventer with intermediate atmospheric vents	Low hazard	Backpressure or backsiphonage Sizes 1/4"-3/4"	ASSE 1012 CSA CAN/CSA-B64.3
Dual-check-valve-type backflow preventer	Low hazard	Backpressure or backsiphonage Sizes 1/4" – 1"	ASSE 1024
Hose connection backflow preventer	High or low hazard	Low head backpressure, rated working pressure backpressure or backsiphonage Sizes 1/2" – 1"	ASSE 1052
Hose connection vacuum breaker	High or low hazard	Low head backpressure or backsiphonage Sizes 1/2", 3/4", 1"	ASSE 1011 CSA CAN/CSA-B64.2
Laboratory faucet backflow preventer	High or low hazard	Low head backpressure and backsiphonage	ASSE 1035, CSA B64.7
Pipe-applied atmospheric-type vacuum breaker	High or low hazard	Backsiphonage only Sizes 1/4"-4"	ASSE 1001 CSA CAN/CSA-B64.1.1
Pressure vacuum breaker assembly	High or low hazard	Backsiphonage only Sizes 1/2"-2"	ASSE 1020
Spillproof vacuum breaker	High or low hazard	Backsiphonage only Sizes 1/4"-2"	ASSE 1056
Vacuum breaker wall hydrants, frost-resistant, automatic draining type	High or low hazard	Low head backpressure or backsiphonage Sizes 3/4", 1"	ASSE 1019 CSA CAN/CSA-B64.2.2

"For SI: 1 inch = 25.4 mm.

- a. Low hazard – See Pollution (Section 202). High hazard – see Contamination (Section 202).
- b. See Backpressure (Section 202). See Backpressure, Low Head (Section 202). See Backsiphonage (Section 202)."

Sec. P3001. GENERAL.

[§ P3001.4 is hereby added as follows:]

"*Section P3001.4. Sewer required.* Every building in which plumbing fixtures are installed and all premises having drainage piping shall be connected to a public sewer, where available, or an approved private disposal system in accordance with the Maricopa County Health Department Environmental Service Division. The public sewer may be considered as not being available only when so determined by the Maricopa County Health Department Environmental Service Division."

Sec. P3103. VENT TERMINALS.

[§ P3103.1 is hereby added as follows:]

"Section P3103.1 Roof extension. All open vent pipes which extend through a roof shall be terminated at least 6 inches (152 mm) above the roof, except that where a roof is to be used for any purpose other than weather protection, the vent extensions shall be run at least 7 feet (2134 mm) above the roof."

Table E3503.1. SERVICE CONDUCTORS AND GROUNDING ELECTRODE CONDUCTOR SIZING

[§ Table E3503.1 is hereby amended as follows:]

**"Table E3503.1
SERVICE CONDUCTORS AND GROUNDING ELECTRODE
CONDUCTOR SIZING**

Conductor Types and Sizes for 120/240-Volt and 120/208-Volt, 3-Wire, Single-Phase Dwelling Services and Feeders. Conductor Types RH, RHH, RHW, RHW-2, THHN, THHW, THW, THW-2, THWN, THWN-2, XHHW, XHHW-2, SE, USE, USE-2					
Copper (AWG or kcmil)	Aluminum or Copper-Clad Aluminum (AWG or kcmil)	Service or Feeder Rating (Amperes)		Min. Grounding Electrode Conductor size ^a (AWG)	
		≤ 30°C	> 30°C	Copper	Aluminum
4	2	100	----	8 ^b	6 ^c
3	1	110	----	8 ^b	6 ^c
2	1/0	125	100	8 ^b	6 ^c
1	2/0	150	125	6 ^c	4
1/0	3/0	175	150	6 ^c	4
2/0	4/0	200	175	4 ^d	2 ^d
3/0	250	225	200	4 ^d	2 ^d
4/0	300	250	225	2 ^d	1/0 ^d
250	350	300	250	2 ^d	1/0 ^d
350	500	350	300	2 ^d	1/0 ^d
400	600	400	350	1/0 ^d	3/0 ^d

"a. Where protected by a metal raceway, grounding electrode conductors shall be electrically bonded to the metal raceway at both ends.

"b. No. 8 grounding electrode conductors shall be protected with metal conduit or nonmetallic conduit.

"c. Where not protected, No. 6 grounding electrode conductors shall closely follow a structural surface for physical protection. The supports shall be spaced not more than 24 inches on center and shall be within 12 inches of any enclosure or termination.

"d. Where the sole grounding electrode system is a ground rod or pipe as covered in Section E3508.2, the grounding electrode conductor shall not be required to be larger than No. 6 copper or No. 4 aluminum. Where the sole grounding electrode system is the footing steel as covered in Section E3508.1.2, the grounding electrode conductor shall not be required to be larger than No. 4 copper conductor.

"CAUTION - UTILITY COMPANY CONDUCTOR SIZE REQUIREMENTS MAY VARY. CONSULT WITH SERVING UTILITY PRIOR TO INSTALLATION."

Sec. E3601. GENERAL.

[§ P3601.1 is hereby amended as follows:]

"Section E3601.1. Scope. This chapter covers branch circuits and feeders and specifies the minimum required branch circuits, the allowable loads and the required overcurrent protection for branch circuits and feeders that serve less than 100 percent of the dwelling unit load. Feeder circuits that serve 100 percent of the dwelling load shall be sized in accordance with the procedures in Chapter 35. Aluminum conductors smaller than #8 shall not be used for lighting or power circuits indoors."

Sec. E3801. RECEPTACLE OUTLETS.

[§ P3801.11 is hereby amended as follows:]

"Section E3801.11. HVAC outlet. A 125-volt, single-phase, 15 or 20 ampere rated convenience receptacle outlet shall be installed for the servicing of heating, air-conditioning and refrigeration equipment. The receptacle shall be accessible and shall be located on the same level and within 25 feet (7620 mm) of the heating, air-conditioning and refrigeration equipment. The receptacle outlet shall not be connected to the load side of the HVAC equipment disconnecting means and shall be protected in accordance with Section E3802.4."

Sec. E3802. GROUND-FAULT AND ARC-FAULT CIRCUIT-INTERRUPTER PROTECTION.

[§ P3802.11 is hereby amended as follows:]

"Section E3802.11. Bedroom receptacles. All 125-volt, single-phase, 15- or 20-ampere receptacles installed in dwelling unit bedrooms shall be protected by an arc-fault circuit interrupter listed to provide protection of the entire branch circuit that supplies such receptacles."

Sec. E3808. GROUNDING.

[§ P3808.8 is hereby amended as follows:]

"Section E3808.8. Types of Equipment Grounding Conductors. The equipment grounding conductor run with or enclosing the circuit conductors shall be one or more or a combination of the following:

- "1. A copper or other corrosion-resistant conductor. This conductor shall be solid or stranded; insulated, covered, or bare; and in the form of a wire or a busbar of any shape.
- "2. Threaded rigid metal conduit and fittings.
- "3. Threaded Intermediate metal conduit and fittings.
- "4. Electrical metallic tubing with an individual equipment grounding conductor.
- "5. Flexible metal conduit with an individual equipment grounding conductor or where both the conduit and fittings are listed for grounding.
- "6. Armor of Type AC cable with an individual equipment grounding conductor.

"7. Surface metal raceway.

"8. Metal-clad cable with an individual equipment grounding conductor or, where both the cable and fittings are listed for grounding.

"9. Liquid-tight flexible metal conduit with an individual equipment grounding conductor or where both the conduit and fittings are listed for grounding."

Appendix G. SWIMMING POOLS, SPAS, AND HOT TUBS.

[§ Section AG102 is hereby amended as follows:]

"SWIMMING POOL. Any structure intended for swimming or recreational bathing that contains water over 18 inches (430 mm) deep. This includes in-ground, aboveground, and on-ground swimming pools, hot tubs, and spas."

Appendix G. SWIMMING POOLS, SPAS, AND HOT TUBS.

[§ Section AG105.2, Item 1. is hereby amended as follows:]

"1. The top of the barrier shall be at least 5 feet (1525 mm) above grade measured on the side of the barrier that faces away from the swimming pool. The maximum vertical clearance between grade and the bottom of the barrier shall be 2 inches (51mm) measured on the side of the barrier that faces away from the swimming pool. Where the top of the pool structure is above grade, such as an aboveground pool, the barrier may be at ground level, such as the pool structure, or mounted on the top of the pool structure. Where the barrier is mounted on top of the pool structure, the maximum vertical clearance between the top of the pool structure and the bottom of the barrier shall be 4 inches (102 mm)."

Appendix G. SWIMMING POOLS, SPAS, AND HOT TUBS.

[§ Section AG105.5 is amended as follows:]

"Section AG105.5. Barrier exceptions: .

"1. Spas or hot tubs with a safety cover which complies with ASTM F 1346, as listed in Section AG107, shall be exempt from the provisions of this appendix.

"2. Where the premises upon which a swimming pool, spa, or hot tub is located adjoins that body of water recorded as Tract S of The Lakes, an enclosure parallel to the bank is not required; provided, that an abutting enclosure, conforming to AG105, extends horizontally to the lakeside edge of the lake bank or beyond. For purposes of this exception, the word "abutting" shall mean terminating at the point of contact with the lakeside edge of the bank."

Appendix G. SWIMMING POOLS, SPAS, AND HOT TUBS.

[§ Section AG105.6 is added as follows:]

"Section AG105.6 Unenclosed pools. It is hereby declared to be a public nuisance and dangerous to the public health, safety, and welfare to maintain an outdoor swimming pool, spa or hot tub in the city unless enclosed in accordance with AG105, It shall be the responsibility of both the property owner and the occupant of the premises to install and maintain the fences, locks, latches, alarms, and gates in good condition and proper working order when water is in the pool, and either or both may be deemed in violation of this chapter for failure to do so."

Appendix G. SWIMMING POOLS, SPAS, AND HOT TUBS.

[§ Section AG105.7 is added as follows:]

"Section AG105.7. Prerequisites to issuance of building permit. A building permit shall not be issued for any swimming pool, spa or hot tub unless the plans for such pool provide for an enclosure as required by this article."

Appendix G. SWIMMING POOLS, SPAS, AND HOT TUBS.

[§ Section AG105.8 is added as follows:]

"Section AG105.8. Final inspection and approval. No swimming pool, spa or hot tub shall be filled in whole or in part with water unless the pool enclosure has been installed in accordance with this article and approved by the development services manager or authorized representative.

Appendix K. SOUND TRANSMISSION.

[§ Section AK102.1 is amended as follows:]

"Section AK102.1 General. Airborne sound insulation for walls and floor-ceiling assemblies separating dwelling units from each other shall meet a Sound Transmission Class (STC) rating of no less than 50 (45 if field tested) when tested in accordance with ASTM E 90. Penetrations or openings in construction assemblies for piping; electrical devices; recessed cabinets; bathtubs; soffits; or heating, ventilation or exhaust ducts shall be sealed, lined, insulated or otherwise treated to maintain the required rating."

Appendix K. SOUND TRANSMISSION.

[§ Section AK103.1 is amended as follows:]

"Section AK103.1. General. Floor/ceiling assemblies between dwelling units or between a dwelling unit and a public or service area within a structure shall have an Impact Insulation Class (IIC) of no less than 50 (45 if field tested) when tested in accordance with ASTM E 492."